

**Measuring Up  
Gender, Burden of Disease,  
and Priority Setting Techniques  
in the Health Sector**

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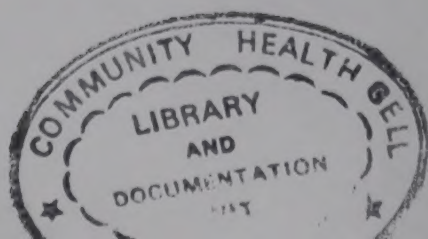
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## GLOBAL HEALTH EQUITY INITIATIVE

The working papers in the series on "Gender and Health Equity" arise from two workshops held at the Harvard Center for Population and Development Studies in 1997 and 1998. The workshops were organized as part of the Global Health Equity Initiative (GHEI), a comprehensive project on health equity funded in part by the Rockefeller Foundation and the Swedish International Development Agency. The GHEI is an interdisciplinary project that combines conceptual work on health equity with country-case studies. Other conceptual working groups, similar to the Gender and Health Equity project, are focussing on cross-cutting issues like "measurement", "ethics", and "social determinants". Some of the working papers within this series on Gender and Health Equity will appear jointly in a volume edited by Gita Sen, Pirooska Ostlin and Asha George.





## ABSTRACT

The 1993 World Development Report introduced a number of new concepts for health sector planning (the Global Burden of Disease, the minimum package of clinical services and DALYs). The Global Burden of Disease methodology raises important questions for the measurement of health, in particular relating to the linkages between sex, gender and health. A number of these problems are related to the availability of disaggregated data about sex differences in susceptibility, natural history, and consequences of illness. A range of other problems are linked to conceptual issues concerning the measurement and valuation of health. The use of measures of disease burden in cost-effectiveness analysis to allocate health sector resources also raises a number of gender-related concerns. This paper discusses the methods for measuring disease burden, and presents a critique based on a gender analysis. It then reviews the implications of cost-effectiveness methods for resource allocation in the health sector, looking at both gender and equity issues. It concludes with a discussion of a two-track process for improvement the measurement of health. Improvements can be made to existing measures by improving the availability of information about the health of women and men. At the same time, additional work is required to move from a measure of *disease* to a measure of *health* which can be used in health sector planning.





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## INTRODUCTION

The 1993 World Development Report (World Bank 1993) introduced a number of new terms into the language of international health policy. Phrases such as the "Global Burden of Disease" (GBD), "priority setting", the "minimum package of clinical services", and DALYs (Disability-Adjusted Life Years) have increasingly appeared in health policy discussions, and the associated methodologies have been advocated as tools for planning in the health sector. The Global Burden of Disease and Injury series, a multi-volume work presenting aggregate estimates of the burden of disease arising from different causes in 1990, represents an extraordinary effort to gather demographic and epidemiological information. The series also includes a number of specialist volumes, one of which is concerned with the "Health dimensions of sex and reproduction" (Murray and Lopez 1998).

Methods for measuring the total disease burden at the global level, and for setting priorities among health interventions using the principles of cost-effectiveness, require measures of health status which can be used to aggregate across different disease conditions with very different profiles of health consequences. These include disease incidence, duration, severity and mortality. The DALY is one such indicator that has achieved international prominence (though other measures exist), and which combines all these aspects in one composite measure.

While the GBD methodology, and the use of DALYs to measure the burden arising from different health problems, have been widely applied, considerable controversy has also arisen around their use (see for example, Anand and Hanson 1997, 1998; Barker and Green 1996; Paalman et al. 1998). While little attention has been paid to date (exceptions are Sundby 1998 and WHO 1998b), gender issues are also crucial to evaluating the usefulness of DALYs and the GBD. In particular, there is a need to clarify the linkages between sex and gender in order to measure the health of women and of men.<sup>1</sup> For example, it has long been recognized that in most societies, women live longer, but experience more ill-health. Part of this greater morbidity is, naturally, due to women's longer life expectancies, which increases their risk of exposure to non-fatal health outcomes. Part is also due to the morbidities associated with reproduction. A range of other causes of ill-health, such as work-related musculoskeletal disorders, are also relatively more common among women and a significant cause of ill-health. However, there are a range of other sex and gender-related factors which contribute to greater ill-health of women, and which need to be understood in order to adequately measure women's ill-health. Similarly, men's greater exposure to certain behavioural, occupational and environmental hazards, many of which are related to socioculturally-determined gender roles, contributes to their shorter life expectancy. A better understanding of the linkages between sex, gender and health is needed in order to properly measure the burden of disease; and in turn, appropriate measures of disease burden should help clarify these linkages.



More broadly, both the measurement of disease burden and the separate exercise of prioritizing resource allocation raise issues for equity (Anand and Hanson 1997; 1998). A distinction needs to be made between the "positive" exercise of measuring the burden of disease and the normative one of allocating resources to reduce this burden (though, measurement itself embodies values, see Murray 1994). Most crucially, any process for allocating resources among disease priorities necessarily requires values and judgements, since it ultimately involves the allocation of resources among individuals. Furthermore, these resource allocation processes frequently take place in political arenas, where values may not be made explicit, and objectives may be unclear or mutually conflicting.

In this paper I argue that there are a range of factors which may bias the measurement of health using the GBD approach. Some of these are related to data availability, and thus amenable to "technical" fixes; while others are conceptual issues related to the measurement and valuation of ill-health. There may also be particular limitations of the cost-effectiveness approach for addressing health problems, both because of the gendered processes that contribute to ill-health, and because of its narrow focus on a limited range of health interventions. In keeping with this distinction between burden measurement and resource allocation, this paper is structured as follows. I begin with a discussion of methods for measuring disease burden, reviewing the approaches and indicators that have been used, including DALYs, and briefly discuss some of the summary data on the Global Burden of Disease in 1990. I then present a number of criticisms of this approach, focusing on issues related to gender. The second half of the paper is concerned with priority setting methods and cost-effectiveness analysis. I present a brief general critique of cost-effectiveness analysis, in particular the implications of such an approach for equity; and then look at cost-effectiveness methods from a gender perspective, identifying a number of areas where biases and inappropriate allocations are likely to arise from a narrow application of the cost-effectiveness approach.

In the final section, I outline a two-track process for improving the measurement of health, in order to make it more sensitive to gender-related concerns. Given that the World Health Organization proposes to carry out a new GBD exercise in the year 2000, this would seem a critical time for considering how measures of health status can be improved so as to present a more accurate picture of the health of women and men, and to further disentangle the relationships between sex, gender and health.

## **1. MEASURING THE "BURDEN OF DISEASE"**

There are a number of reasons why we might be interested in knowing the aggregate quantity of ill-health, its distribution among population sub-groups, and the relative contributions of different diseases and conditions to the total. For example, it is useful for understanding the scale of health



problems, and their distribution among individuals, countries, regions, socioeconomic groups, etc. It might also form the basis for policies aimed at reducing ill-health, such as setting priorities, and for measuring the success of such policies.

It is important to recognize the ethical implications of health status measurement. First, any measure will incorporate a *valuation* of different health states: there is no such thing as a purely "objective" measure. Valuation also enters in the choice of what to include and exclude from the measurement -- for example, whether the "burden" should be that of the individual alone, or take into account the second-order health or other effects on others. Secondly, health status measurement will have ethical implications if it is used to influence the allocation of resources among individuals, such as setting priorities among interventions (Murray 1994: 3).

How should ill-health be measured, and what is an appropriate unit of measurement? Here, a key distinction is between measurement of the disease burden of an individual, and measuring ill-health at the population level. An individual's burden can be captured through disease- or body system-specific measure of illness, such as pain scales, attack rates, or one of the large number of specialized tools that have been developed (see Bowling 1995 for a comprehensive review of disease measures). For conditions which are always fatal, and for which the main health consequence is premature death, life years lost could be used to measure the burden of illness. However more complex problems arise when we undertake to quantify disease at the population level, which requires aggregating across individuals with ill-health arising from conditions with multiple consequences (e.g. premature death, different forms of disability, pain).<sup>2</sup>

#### Review of approaches and indicators for measuring ill-health

Early approaches to measurement of health of populations looked only at mortality (e.g. potential years of life lost, infant mortality rate, life expectancy at birth), and thus focused on the main causes of death, failing to capture the significant amount of ill-health that results in disability or morbidity. During the 1960s and 70s, efforts were initiated to measure non-fatal health outcomes at the individual level, and a huge literature now exists on measurement of health-related quality of life (HRQL). For comparisons of individuals, three main groups of instruments can be identified (Fox-Rushby 1994): "generic" measures which allow comparison across contexts and disease groups (examples of these would include the McMaster Health Index Questionnaire, the Sickness Impact Profile, the SF-36, and the Nottingham Health Profile); disease-specific measures (e.g. scales for assessing cancers, psychiatric conditions, neurological conditions, etc); and a third group of indicators which combine mortality and morbidity. These include Quality Adjusted Life Years (QALYs) (Weinstein and Stason 1976), and the Euroqol (Euroqol Group 1990). QALYs adjust time spent in less-than-perfect health using "quality weights",



which range from 1 (perfect health) to 0 (death). QALYs have generally been used for assessing the effectiveness of health interventions, and comparing the cost-effectiveness of health interventions which have different profiles of morbidity and mortality improvements. They have not been used for measuring the health of populations (although some have advocated their use for this purpose, see for example, Williams 1999).

Two major efforts have attempted to measure the quantity of ill-health at the population level and include both premature mortality and non-fatal health outcomes. The first was the Ghana Health Assessment Project (Ghana Health Assessment Project Team 1981), which developed a method to quantitatively estimate the health impact of different disease problems, in order to compare the potential impact on population health of different intervention programmes. The unit of measurement was the "number of days of healthy life" lost due to a disease, which included both mortality and morbidity ("the extent and duration of disability and illness among those attacked by the disease" p. 74). While quite widely known, the method does not appear to have been adopted by other researchers. One reason may be the scale of the data collection process that is required. It is also not clear whether the assessment results had an impact on policy and resource allocation.

The next major effort to measure the health of populations using composite measures (i.e. those which combine mortality and morbidity) was the Global Burden of Disease study, which was developed as an input into the 1993 World Development Report Investing in Health, and was jointly undertaken by the World Bank and the World Health Organization. Subsequently a series of volumes has been published (Murray and Lopez 1996 etc.) containing revised and refined estimates of the global burden of disease in 1990.

The unit of measurement for the burden of disease in the GBD exercise is the Disability-Adjusted Life Year (DALY). The DALY, like the QALY, is a composite measure of health status, which combines the time lost to premature mortality (Years of Life Lost "YLLs") and the time lived with a disability (Years Lived with Disability "YLDs"). Time lost to premature death is measured in relation to a standard expectation of life (80 for men and 82.5 for women), using model life tables. Time lived with disability is translated into an equivalent time loss, using a set of weights which reflect reduction in functional capacity. DALYs incorporate 4 "values" in their construction: the choice of expectation of life at each age which, for the purposes of GBD, reflects life expectancy in a low-mortality setting; the sex gap in life expectancy (that part of the gap which is assumed to be related to biological differences in longevity between the sexes); the value of a year of life lived at each age (age weights); and the value of time lived at different time periods (discounting). The first three carry direct gender implications, and need to be analyzed from a gender perspective. Discounting has gender implications through its indirect effect on both the gender gap in life expectancy and age-weighting.



## 2. THE ESTIMATED GLOBAL BURDEN OF DISEASE IN 1990: MAIN FINDINGS

There are marked differences in the patterns of health and illness in women and men. In particular, in most societies, women tend to live longer. However, they also tend to report more illness and distress than men (WHO 1998a: 12, and references therein), due to a complex relationship between biological and social influences (WHO 1998a: 12). Global estimates of the burden of disease have been produced in The Global Burden of Disease (Murray and Lopez 1996). Tables 1 through 7 present summary figures on the global burden of disease in 1990.

The total number of DALYs lost in 1990 was 1,379,238 thousand. Of these, 52% were lost by men, and 48% by women. The GBD exercise divides causes of death into three groups: Group I consists of communicable, maternal, perinatal and nutritional conditions; Group II is made up of non-communicable diseases; and Group III is injuries, including intentional and unintentional injury. In terms of total DALYs lost, group I constitutes 44%; group II, 41%; and group III makes up the remaining 15% of the total disease burden.

However, breaking down these aggregate figures by sex provides additional insights into the relative burdens of women and men. Females have a relatively greater burden arising from Group I conditions (which make up 48% of the total female burden vs. 41% of the male burden) and similar contributions from Group II diseases (41% vs. 40%). However, injuries make up a smaller proportion of the total female disease burden (11% in females compared with 19% in males).

Table 1: Total DALYs lost in 1990, all regions

	Male	Female	Total
Population (millions)	2,654	2,614	5,267
DALYs (thousands)	722,032	657,206	1,379,238
Percent of total	52%	48%	100%

Source: Tables 7i, 8i and 9i in Murray and Lopez, *The Global Burden of Disease*.

Table 2: Total DALYs lost in 1990, all regions, by disease group (column percentages)

	Male		Female		Total	
	DALYs ('000)	% of total	DALYs ('000)	% of total	DALYs ('000)	% of total
I. Communicable, maternal, perinatal and nutritional conditions	294,175	41	311,784	48	605,959	44
II. Non-communicable diseases	292,626	40	272,006	41	564,632	41
III. Injuries	135,231	19	73,415	11	208,647	15
Total		100		100		100

Source: Tables 7i, 8i and 9i in Murray and Lopez, The Global Burden of Disease.

Further disaggregating DALYs into its two sub-components, premature mortality (YLLs) and disability (YLDs) provides additional insight into sex differences in the burden of ill-health. Overall, the number of years lost to premature mortality is greater for males than females. For Group I conditions, the shares are approximately equal, however, for Group II and Group III, the male share of total mortality is relatively higher. In contrast, while the total number of years lived with disability is approximately equal for men and women, females experience a relatively higher share of total disability arising from Group I conditions (59% vs. 41%). For Group II the distribution is approximately equal between men and women, but males contribute the greater share of disability arising from Group III conditions.

The third panel of Table 3 shows the contribution of premature mortality (YLLs) and disability (YLDs) to total DALYs lost by each sex in each of the three main disease groups. While overall, disability contributes about one-third of total DALYs lost, women experience higher levels of disability than men in all three disease groups, with the difference being most marked for Group I conditions (22% of total DALYs vs. 16%), reflecting the burden of reproductive-related disability. This is consistent with the observation that women live longer than men but experience more morbidity.



Table 3: Relative contributions of premature mortality (YLLs) and disability (YLDs) in 1990, all regions, by main disease group

Years of Life Lost (YLLs)('000)	Male	Female	Total
Total	486,937 (54%)	419,565 (46%)	906,501 (100%)
Group I	246,875 (50%)	243,713 (50%)	490,588 (100%)
Group II	152,937 (54%)	130,458 (46%)	283,395 (100%)
Group III	87,125 (66%)	45,394 (34%)	132,519 (100%)
Years Lost to Disability (YLDs) ('000)			
Total	235,096 (50%)	237,641 (50%)	472,736 (100%)
Group I	47,300 (41%)	68,072 (59%)	115,372 (100%)
Group II	139,689 (50%)	141,548 (50%)	281,237 (100%)
Group III	48,107 (63%)	28,021 (37%)	76,128 (100%)
YLDs as a percentage of total DALYs, by disease group			
Total	33%	36%	34%
Group I	16%	22%	19%
Group II	48%	52%	50%
Group III	36%	38%	36%

Source: Tables 7i, 8i and 9i in Murray and Lopez, The Global Burden of Disease.

Relative inequalities in health across regions are shown by analyzing differences in the aggregate disease burden. One way of making crude comparisons across regions is DALYs per 100,000 population (Table 4). Here, the burden of ill-health associated with poverty is very clear. The highest absolute burden of ill-health is found in Sub-Saharan Africa, where DALYs per hundred thousand population is over 4 times higher than in the established market economies. The next highest burdens are found in India (nearly three times higher than "developed" countries), and the Middle-East Crescent (2.4 times higher than "developed" countries).

In terms of the composition of the burden of ill-health there are also regional differences (Table 5). For example, Group I conditions (communicable, maternal, perinatal, and nutritional) account for only 7-10% of all DALYs lost in established market economies and in the former socialist countries of Europe. However, they make up over 50% of all DALYs lost in India and Sub-Saharan Africa, and almost 50% in other Asia and islands, and in the Middle East crescent. In all regions, Group I conditions

account for a greater share of the burden for women than for men. In contrast, Group III conditions (Accidents and Injury) are consistently a greater share of burden for men than for women. Considerable regional variations are apparent, with accidents and injury accounting for nearly 25% of men's disease burden in the former socialist countries of Europe, in Sub-Saharan Africa, and in Latin America and the Caribbean.

Table 4: DALYs lost per 100,000 population in 1990, by region

	Male	Female	Total
Established Market Economies	14,029	10,830	12,396
Former Socialist Countries of Europe	21,615	14,661	17,977
India	32,390	35,500	33,892
China	18,573	18,203	18,394
Other Asia and Islands	27,563	24,345	25,961
Sub-Saharan Africa	61,350	54,532	57,901
Latin America and the Caribbean	24,197	19,986	22,087
Middle East Crescent	30,309	29,659	29,990

Source: Murray and Lopez 1996, tables 7a - 8h.

Table 5: Regional Patterns in Percentage of DALYs lost by Disease Group, for males and females separately

	Group I		Group II		Group III	
	M	F	M	F	M	F
Established Market Economies	7	8	78	85	16	7
Former Socialist Countries of Europe	7	11	68	79	25	10
India	54	59	30	28	17	13
China	22	27	58	58	20	15
Other Asia and Islands	42	48	40	42	18	10
Sub-Saharan Africa	62	70	18	20	20	10
Latin America and the Caribbean	33	39	45	52	22	10
Middle East Crescent	45	51	39	40	16	9

Source: Murray and Lopez 1996, tables 7a-8h

\*Row totals may not add up to 100% because of rounding.



The GBD volume provides more disaggregated data on deaths and disability due to specific causes. Tables 6 and 7 show the 10 leading causes of DALYs for adults in developing and developed regions. A number of interesting differences can be seen. TB and iron-deficiency anaemia are relatively more important causes of women's ill-health in developing regions, and a number of the other leading causes are related to reproductive health. For men, the top 10 causes reflect a considerable burden related to behavioural factors (accidents, violence, alcohol and injury). The burden of mental health conditions is apparent in both regions, but more pronounced in developed countries.

Table 6: Ten leading causes of DALYs lost in female and male adults (15-44 years) in 1990 for developing regions

Females	DALYs ('000)	Cumulative %	Males	DALYs ('000)	Cumulative %
All causes	177,227	100	All causes	180,211	100
Unipolar major depression	22,740	12.8	Unipolar major depression	12,658	7.0
Tuberculosis	8,703	17.7	Road traffic accidents	11,387	13.3
Iron-deficiency anaemia	7,135	21.8	Tuberculosis	10,747	19.3
Self-inflicted injuries	6,526	25.5	Violence	9,844	24.8
Obstructed labour	6,033	28.9	Alcohol use	8,420	29.4
Chlamydia	5,364	31.9	War	7,448	33.6
Bipolar disorder	5,347	34.9	Bipolar disorder	5,601	36.7
Maternal sepsis	5,226	37.8	Self-inflicted injuries	5,478	39.7
War	4,934	40.6	Schizophrenia	5,068	42.5
Abortion	4,856	43.4	Iron-deficiency anaemia	4,898	45.3

Source: Murray and Lopez (1996) Table 5.4

Table 7: Ten leading causes of DALYs lost in female and male adults (15-44 years) in 1990 for developed regions

Females	DALYs ('000)	Cumulative %	Males	DALYs ('000)	Cumulative %
All causes	24,674	100	All causes	36,943	100
Unipolar major depression	4,910	19.8	Alcohol use	4,677	12.7
Schizophrenia	1,450	25.7	Road traffic accidents	4,167	23.9
Road traffic accidents	1,137	30.3	Unipolar major depression	2,664	31.1
Bipolar disorder	1,106	34.7	Self-inflicted injuries	2,072	36.8
Obsessive-compulsive disorders	933	38.5	Schizophrenia	1,578	41.0
Alcohol use	801	41.7	Drug use	1,404	44.8
Osteoarthritis	783	44.9	Violence	1,196	48.1
Chlamydia	599	47.3	Ischaemic heart disease	1,160	51.2
Self-inflicted injuries	569	49.6	Bipolar disorder	1,135	54.3
Rheumatoid arthritis	549	51.8	HIV	911	56.7

Source: Murray and Lopez (1996) Table 5.4

A specialized volume of the GBD series presents additional detail about the calculation of the burden of reproductive health (Murray and Lopez 1998). It contains a series of authored chapters that present the basis for the DALY calculations for a range of conditions including STDs, maternal and perinatal conditions, and one risk factor (unsafe sex). An introductory summary discusses alternative definitions of reproductive health, and shows how the burden of reproductive conditions depends on the definition chosen (see Table 8). These range from highly restrictive definitions (A and C) through to highly inclusive definitions (D and E). The definitions closest to the WHO conceptualization of reproductive health would be A (consequences of sex in adults) and C (conditions of the reproductive organ system); definitions E and F are very different from the "traditional" notion of reproductive health as they focus on the reproductive age group rather than health conditions related to reproduction *per se*, but recognize that many of the risks for reproductive health do not arise from traditional reproductive causes (and may, indeed, arise from highly gendered patterns of behaviour). However, the estimates of burden which are presented for each of these classifications are still dependent on the same basic calculations and the data available in the GBD.

This chapter also contrasts the patterns of burden when it is measured as deaths alone from reproductive causes; and DALYs arising from reproductive causes. The authors note that the pattern of ill-health measured by DALYs is substantially different from that of deaths alone due to the young age of



many of the deaths associated with reproductive illness and the large contribution of reproductive conditions that result in disability (p. 13).

Table 8: Alternative definitions of Reproductive Health

Definition	Includes:
A: Consequences of sex in adults	STDs in the sexually active population, maternal causes, portion of adult cancers, HIV and Hepatitis B that is sexually transmitted.
B: Consequences of sex in children and adults	Conditions in definition A + congenital anomalies and conditions arising during the perinatal period, burden in age groups 0-4 and 5-14 from STDs, and fraction of cancers, HIV and Hepatitis B that is sexually transmitted.
C: Conditions of the reproductive organ system	All sexually transmitted diseases, maternal conditions, and reproductive cancers
D: Conditions managed through reproductive health services	All causes of burden in children aged 0-4 years, maternal conditions
E: Burden of the reproductive age group (15-44 years).	All causes of premature mortality and disability in the age group 15-44 years.
F: Conditions predominantly affecting the reproductive age group	All causes of disease and injury for which age-specific DALY rates at ages 15-44 is more than 1.5 times higher than the crude DALY rate for all age groups. For men, this includes STDs, HIV, Chagas disease, unipolar major depression, bipolar affective disorder, schizophrenia, alcohol dependence, multiple sclerosis, drug dependence, obsessive-compulsive disorder, panic disorder, self-inflicted injuries and violence. For women, similar list, but including maternal causes and excluding violence.

Source: Murray and Lopez (1998)

### 3. GENDER ISSUES AND THE GLOBAL BURDEN OF DISEASE:

#### HOW DOES IT MEASURE UP?

The amount of information presented in the GBD represents an enormous and impressive effort to collect and present epidemiological and demographic data. Nonetheless, a certain amount of caution is needed in interpreting these findings. Specifically, we need to ask whether there are potential biases in the data and the methods which might obscure the true relationship between sex, gender and health. For example, if disability is more difficult to measure (and therefore potentially less reliable) than mortality, the greater burden of disability among women that was seen in Table 3 may be understated. Furthermore, some of those conditions which are more likely to result in disability for women than for men (e.g.

violence) may also be more prone to under-reporting by women, leading to a general understatement of the burden of women relative to that of men.

I discuss the gender issues related to burden of disease measurement in three categories. First, there are conceptual issues related to what is being measured. Secondly, there are biases that arise through the estimation of disease prevalence and incidence. The third set of issues relate to the biases that arise from the methods for measuring and valuing ill-health. I argue that while the second category of problem can be resolved through collection of more complete, disaggregated data, the first and third categories pose more thorny conceptual challenges to methods for measuring health.

#### a. What is being measured?

It is important to note that DALYs are a measure of disease, not of health. DALYs measure ill-health as a shortfall from a maximum achievable level of health, defined by a standardized expectation of life at each age. Shortfalls are attributed to a single disease. This is consistent with the intended use of this analysis, which is to direct resources towards health interventions (often, but not always provided through health services) which will reduce or eliminate the burden.

In addition to disease, GBD estimates were also made for the burden attributable to a number of risk factors for disease, such as malnutrition. I discuss the gender implications of this analysis in Section 4.

#### i. *Measures of disease vs. measures of health*

A tool for measuring disease may not be an ideal tool for planning in the health sector, and may introduce a particular form of gender bias into the planning process. This is because so many of women's activities and women's health services are about producing health, rather than treating disease.<sup>3</sup> For example, some 20% of hospital admissions in Tanzania are related to pregnancy and childbirth. While some fraction of these would contribute to the burden of disease (through complications leading to "maternal conditions", in Group IC of the GBD), most of this use of health services is aimed at promoting health, through ensuring access to obstetric interventions in case of complications. In a study of differences in health problems in primary care in the Netherlands, Gijsbers van Wijk et al. (1992) found that women's higher visiting rates for screening and diagnostics (e.g. cervical smears) and preventive purposes (e.g. contraception) explained more than 25% of the overall sex difference in reported health problems (a category used in their analysis which is highly correlated with utilization). In a follow-up study, Gijsbers van Wijk et al. (1995) found significant sex differences in utilization of prevention and diagnostics in all age groups under 65 years, concluding that "up to the age of 65,... preventive health behaviour is put into



practice to a much larger degree by women than by men" (p. 606). In contrast, a much smaller share of men's use of health services is positively related to health in this way, in that they tend to seek health care after identifying a particular health problem, and use services in order to prevent death or disability.

#### *ii. Attribution of the full shortfall to a single disease*

A second issue relates to assumptions about the causes of ill-health which are implied by the disease focus. Specifically, in attributing the whole shortfall between the age at death or onset of a disabling condition to a single disease, the method implicitly assumes that the lost stream of healthy life would in fact be lived in perfect health. However, particularly in high mortality regions, averting a death (e.g. a child death from malaria) means that the individual continues to be vulnerable to other diseases. This is particularly problematic for the calculations of the cost-effectiveness of interventions, where the assumed health gain from intervention may be overestimated. But it also may overstate the true burden of illness due to particular causes.

#### *iii. The burden of disease and underdevelopment*

The difficulties that this attribution process causes are further compounded by the use of the same, standardized life expectancy across all countries. The standard that is used in DALYs (life expectancy at birth of 80 years for men and 82.5 years for women, and a Model West life table<sup>4</sup>) was chosen to reflect the highest life expectancy observed at a national level (Japan). The equity underpinnings of using a common life expectancy for all countries are clear: to ensure that a premature death, say at the age of 55, contributes the same amount to the global burden of disease whether it occurred to a poor woman in Bangladesh or a rich woman in the suburbs of a US city (Murray 1994). Nonetheless, the use of a standardized expectation of life implies that health interventions alone would increase life expectancy to developed country levels. In fact, a multitude of factors and processes contribute to the premature death of a woman in Bangladesh, only some of which could be influenced by the provision of health services. In addition, the DALYs lost will be attributed to only one disease as multiple causes are not handled in the analysis. It would, thus, seem more appropriate to call the burden being measured using such a yardstick "the burden of disease and underdevelopment" rather than the burden of disease alone (Anand and Hanson 1997).

#### *iv. Is disability the appropriate measure of burden?*

In the terminology of the International Classification of Impairment, Disease and Handicap (ICIDH), the GBD exercise seeks to measure disability<sup>5</sup> which reflects impact on individual's performance independent of their social environment.<sup>6</sup> This raises the important question of whether this is always the relevant



burden to be measuring. In particular, it raises the issue, which I shall return to in the concluding section, of whether the same measure should be used for both burden of disease assessment and resource allocation. An alternative would be consider the amount of handicap caused by a non-fatal health outcome, which would take into the overall consequences of their impairment as influenced by their social environment. Evans and Ranson (1995) have used HALYs (Handicap-Adjusted Life Years) to calculate the burden of trachotomous disease. To the extent that illness is associated with either stigma or consequences that vary with social context (e.g. infertility<sup>7</sup>), handicap may be a better measure of the burden of ill-health, and in some cases handicap may be a more appropriate outcome when allocating health care (and other) resources.

#### *v. Burden for whom?*

The burden which the GBD measures is the burden of ill-health as experienced by the individual; any social consequences are captured only partially through the use of age weights. Other burdens which fall on family, friends and society at large are not included (Anand and Hanson 1997). In particular, women's caring roles and predominant responsibility for reproduction will not be captured through this individualistic approach.

#### **b. Issues in estimation of incidence and prevalence**

Any effort to measure, at a global level, the loss of healthy life and to classify this loss among disease groupings has significant data requirements. For the Global Burden of Disease study, estimates of mortality by cause were constructed from a number of different sources (Murray and Lopez 1996). Where good vital registration data are available, the estimates use deaths coded by the vital registration to the International Classification of Diseases, Version 9 (ICD-9). For India and China, sample registration systems were used. Data from population laboratories were used where these were available. Other sources included epidemiological estimates, cause of death models, and studies by disease experts which generated assessments of incidence, prevalence, remission and case fatality rates.

The aggregation of mortality due to individual diseases was found to arrive at mortality levels exceeding total mortality as estimated by various demographic methods. In order to constrain the aggregate level of mortality due to individual diseases to the upper bound for mortality for each age and sex group, an algorithm was applied by the series editors to reduce cause-specific mortality estimates (AbouZahr 1998; Rowley and Berkley 1998). The process for compressing or "squeezing" the mortality estimates for individual causes to make them fit an aggregate estimate of mortality is somewhat opaque, and there have been some concerns about the implications of this process for the final distribution of



deaths among causes.

Much less data is available for non-fatal compared to fatal health outcomes. In order to estimate the years lost to disability (YLDs), disease experts or groups (who were largely males from developed countries) were identified for 100 conditions. Estimates were made of disease and disability incidence, remission, case fatality rates, prevalence distribution by severity class of disability, drawing on published and unpublished studies. The estimates were reviewed for consistency and then revised and subject to international review and re-review (Murray and Lopez 1996).

Given the extensive data requirements, and the complex process of arriving at estimates of the burden of individual diseases, where might we be concerned about gender bias or inaccuracy in the measurement of the GBD?

*i. Conditions likely to be systematically under-reported for women*

Some conditions may be systematically under-reported and thus underestimated for women. For example, there are conditions for which fear or stigma may discourage reporting either in surveys or in routine statistics.

Violence against women provides one such example. There is little population-based data on the incidence of violence against women, and on its physical and mental health consequences (Heise et al. 1994; WHO 1998a). While better data are now available on wife abuse in both developed and developing countries, the stigma attached to sexual assault means that data on rape and sexual abuse are much more difficult to collect, and are mostly available for developed countries (Heise et al. p. 4).

**Box 1: The health burden of gender-based violence**

In the GBD framework, gender-based violence is a risk-factor rather than a disease itself. In other words, its effect is to increase the incidence of a range of health outcomes. Estimates of the health consequences of rape and domestic violence were produced for the 1993 WDR. The health consequences considered were STDs, HIV, abortion, depression, alcohol dependence, drug dependence, post-traumatic stress disorder, unintentional injuries, suicide, homicide and intentional injury. For each of these consequences, a group of international experts estimated the share of total DALYs attributable to domestic violence and rape. It is estimated that rape and domestic violence account for 5% of DALYs lost by women of reproductive age in demographically developing countries, and 19% in developed countries (World Bank 1993; Heise et al. 1994). The differential between the estimates for developed and developing countries could itself be due to gender bias and underestimation of these causes in developing countries.

Source: Heise et al. (1994), p. 17 and Appendix C.

Deaths from induced abortions and suicides may also be likely to be hidden. Faveau and Blanchet (1989), reporting on a retrospective study of deaths in a demographic surveillance area in Bangladesh, note that deaths due to septic abortion, suicide and homicide are most common among teenaged unmarried women, and that these tend to be under-reported due to the associated stigma and family dishonour.

Other health conditions might be systematically under-reported because women are more likely to be asymptomatic. For example, 50- 80% of sexually transmitted diseases (STDs) in women have either no symptoms or symptoms that are not easily recognized. In contrast, men infected with gonorrhoea or chlamydia are more likely to be symptomatic, and the signs of infection in men are more specific than for women (Handsfield et al 1974 and Stamm and Holmes 1990, both cited in Hawkes 1998). This may have additional health consequences for women, since STDs are a risk factor for HIV infection and to the extent that these infections are not treated, they are differentially exposed to this risk. Women may only seek health care when experiencing secondary complications such as PID, ectopic pregnancy or infertility (Hawkes 1998). Where women's illness is more likely to be asymptomatic, both health service statistics and population-based information will tend to be biased unless the latter includes medical or laboratory examination.

While under-reporting is a clear risk with STDs, over-reporting may also occur in low prevalence areas because of existing algorithms for diagnosis. WHO recommends a syndromic approach to STD management, with diagnosis based on the presence of discharge and lower abdominal pain. However, in areas where the prevalence of STDs is low, this may lead to over-treatment (Sarah Hawkes, personal communication) and thus, overestimates of incidence and prevalence.



## Box 2: Estimating the burden of STDs

GBD estimates of the burden of STDs are described in detail in Rowley and Berkley (1998). Their focus was on the burden of gonorrhoea, chlamydia and syphilis, while estimates of the burden of hepatitis B, HIV and human papilloma virus were conducted by other groups and appear elsewhere in the GBD volumes.

Prevalence was estimated for each region from a review of the medical literature, restricting the focus to studies in low risk populations after 1985. The duration of infection was estimated using an algorithm incorporating assumptions about the probability the individual is symptomatic and the probability of treatment. A probability mapping of disease to sequelae was created, focusing on the effects of major complications with and without treatment. A number of complications were allocated to other sections of the study (ectopic pregnancy, neonatal pneumonia, low birth weight and infertility). Miscarriage and spontaneous abortions were excluded.

The authors of the chapter raise a number of concerns and limitations of their study:

- Prevalence was estimated from a literature survey, and thus was limited by the data available. In particular, the availability of data varied considerably by region.
- Duration was estimated using “average” access to health care and didn’t necessarily take account of differential access of men and women.
- Only three pathogens were examined, out of the more than 40 that are known. There was insufficient information available to include other STDs, though they are also known to be linked to adverse outcomes, HIV and premature delivery.
- Estimates of the burden of STDs exclude social and economic consequences, such as the consequences of infertility which may include anxiety, depression and abandonment.
- Some of the consequences of STDs (e.g. ectopic pregnancy) do not appear as part of the burden of STDs but have been presented separately; this implies that the direct burden of STDs that is included is partial.

Source: Rowley and Berkley (1998)

Differences in health seeking behaviour (in particular between developed and developing countries) may also bias data on disease prevalence and incidence. For example, in many developing countries women use health services less than men. This may be because the burdens of their domestic roles mean that they do not have time to visit health services; because the resources required to attend health facilities are not available to them; or because of poor interpersonal relations with (often male) health providers which discourage them from using services. This can have a significant impact on the validity of epidemiological databases. Ettling et al. (1989) reported significant sex differences in attendance at malaria clinics in Thailand (6:1 in favour of males); yet according to population-based surveys, there were no sex differences in infection rates. Even when mobile malaria services were introduced with the aim of improving diagnosis and treatment of women, sex ratios at mobile clinics remained in the region of 4:1 in favour of males. In their estimation of the burden of STDs, Rowley and Berkley (1998) note that their estimates of duration of infection are based on “average” access to health



care, but that this did not necessarily take account of differential access of women and men to health services. It is very difficult to estimate the burden associated with unmet health needs.

Men's illness may also be under-reported. For example, the current focus of public sector primary health care services on MCH/FP services may discourage men from seeking care. In a study in rural Bangladesh, men with symptoms of STDs were much more likely to use private sources of care, including traditional and less-than-fully qualified practitioners and hardly used the public sector infrastructure (Hawkes 1998). Care sought from these providers hardly ever appears as part of routine utilization statistics.

Issues may be quite different in developed countries, where women tend to use health services more than men. This is partly due to women's greater use of preventive and reproductive health services. However, the finding of women's greater reporting of affective and minor physical disorders has been the subject of considerable research (Gijsbers van Wijk et al. 1992, 1995).

Underutilization of health services may also arise where women feel health services have little to offer. For example, health services may not have the capacity or resources to respond to needs for surgery to repair rectovaginal fistulae. Knowing this, women may not attend health facilities at all. Population-based surveys may be used to detect prevalence of such conditions, but even this approach may not be effective if stigma prevents women from reporting their condition. In addition, the excessive focus of health services on women's reproductive functions means that opportunities for detecting other conditions are missed (Vlassoff and Bonilla 1994).

## *ii. Sex differences in health consequences*

A range of diseases have different health consequences for men and women. Where these are unknown or unmeasured, sex-specific estimates of disease burden will be biased. There is surprisingly little knowledge of differences in the natural history of disease and differences in sequelae for men and women.

Gender bias in the selection of both research topics and research subjects has been widely recognized (Freedman and Maine 1993). Only a fraction of US National Institutes for Health (NIH) resources is devoted to health problems of particular concern to women (ibid.). Even where women and men are both affected by a particular illness, there is a tendency to ignore the potential for differences between men and women in diagnosis, symptoms, prognosis, and effectiveness of alternative treatments (WHO 1998a). Krieger (1994) reminds us that the US NIH has recently resorted to directives requiring researchers doing clinical and epidemiological research to include women and minorities among study subjects.

An example of this is provided by cardiovascular disease. Despite its importance in women's



mortality, and evidence that there are important differences between men and women, nearly all of the most important cohort studies of causes and treatment have been done on men. As a consequence, doctors tend to extrapolate the results to women, even though there is no clinical evidence to support these decisions (Freedman and Maine 1993).

Similarly, women are more likely to be excluded from research studies on HIV/AIDS, leaving unanswered many questions about biological differences in the effects on men and women (WHO 1998a: 25). Women in both rich and poor countries have a shorter life expectancy after a diagnosis of AIDS, a difference which is attributed to the combination of unequal access to health care, and lack of information about the disease in women (Anastos and Vermund 1993; de Bruyn 1992 and Richie 1990, cited in WHO 1998a: 25). It is not clear whether these differences in longevity have been taken into account in the GBD estimates of the burden of HIV.

Finally, until recently there has been little study of the ways in which sex (and gender) affect tropical disease transmission and risk of infection, recognition and response to signs of infection, access to health care and presentation of symptoms. Where these differences have been recognized, they tend to be restricted to the effects of tropical disease on fertility and pregnancy outcomes (Manderson et al. 1993; Vlassoff and Bonilla 1994). While women tend to have higher antibody responses to malaria (Vlassoff and Bonilla 1994) and to leprosy, their immunity is compromised during pregnancy. As a consequence, malaria in pregnancy is associated with abortion, stillbirth, and low birth weight, factors which should be taken into account when evaluating the burden of malaria and the differential effects on women and men. While women typically suffer less severe forms of leprosy than men, during pregnancy they are more likely to become symptomatic, to suffer relapses, and to experience more severe symptoms (Ulrich et al. 1993). Schistosomiasis is another disease where sex differences in natural history and clinical consequences are poorly documented, even though genital schistosomiasis in women has been associated with a range of pathologies including infertility, abortion, pre-term delivery and ectopic pregnancy (WHO 1998a: p. 21). Such gender biases in medical knowledge may lead to misreporting of the incidence and underestimation of the health impact (and thus the health burden) of such conditions for women. Analysis of the cost-effectiveness of intervention will also be systematically distorted to the extent that the results of such studies do not apply to women.

### *iii. Gender differences in susceptibility and responses to ill-health*

In addition to sex differences, gender roles may influence susceptibility to illness, responses to illness, and the consequences of ill-health for well-being. These gender roles and their effects need to be understood in order to capture the true disease burdens. For example, nutritional deficiency is associated with lower immunity and thus, greater susceptibility to a range of infectious diseases such as leprosy, and



discriminatory practices in the allocation of food have been observed in South Asia (Jacobson 1993; Chen et al. 1981). There may be gender differences in occupational exposure, such as women who are differentially exposed to schistosomiasis as a consequence of their water carrying responsibilities.

The consequences of illness may also differ for women and men because of differential access to and use of health services. In some parts of the world, households spend less on health care for women and girls due to son preference (Das Gupta 1987; Chen et al. 1981; Hossain and Glass 1988). Other barriers to use of health services may include cultural practices that deny women the right to travel alone or to consult male health workers (WHO 1998a).

Even with access to health services, the care provided may be insufficiently sensitive to the particular constraints facing women. For example, women may be less likely to benefit from syndromic management of STDs because one of the key screening factors is a history of multiple sexual partners or a spouse's history of multiple partners. Women may be unaware of their partner's exposures, or may be more unwilling than men to share this information with a health worker because of confidentiality and the fear of social disapproval, and consequently more likely to suffer from untreated STDs.<sup>8</sup> In addition, because untreated STDs are more likely to become asymptomatic in women, they are more likely to suffer more disabling sequelae such as PID and infertility.

Although sex differences in the social consequences of ill-health are excluded from the burden of disease calculations, they may influence health outcomes in significant ways, requiring a gender analysis. For example, women may suffer greater social consequences of disfiguring illness such as leprosy and lymphatic filariasis. As a result, they may seek care later for fear of subsequent stigmatisation (WHO 1998a) which may, in turn, lead to greater disability or disfigurement, e.g. for leprosy (Ulrich et al. 1993). More generally, there is evidence that women may seek care later in the course of illness and as a consequence, take longer to recover (Vlassoff and Bonilla 1994).

#### *iv. Range of women's health conditions which are excluded because data not available*

A final broad class of bias arises for the range of women's health conditions where data simply are not available on dimensions, causes and consequences (WHO 1998b). Many obstetric, gynaecological, and contraceptive morbidities are particularly difficult to measure, and, as a result have been excluded from estimates of the GBD. For example, while bacterial vaginosis is a very common reason for seeking health care among women where STD prevalence is relatively low, no estimates have been included in the GBD (Hawkes, personal communication).

A recent WHO report listed a range of conditions that should be considered for inclusion in any GBD revisions. These include indirect obstetric complications, including pre-existing conditions aggravated by pregnancy; a range of excluded gynecological morbidities: other STDs, reproductive tract



infections, menstrual disorders, female genital mutilation and harmful practices and violence; contraceptive morbidity; psychological morbidity; infertility; morbidities attributable to HIV; interlinkages between HIV/STDs; and stillbirths (WHO 1998b: 27).

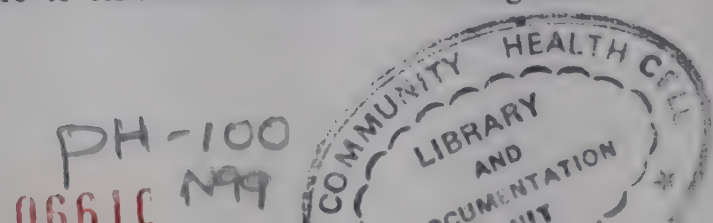
c. Problems of the valuation of ill-health

Many of the issues discussed above could be addressed through improved data gathering processes, structuring them to be sensitive to sex and gender dimensions. However, a broader set of concerns arises in relation to the methods used for assigning values to ill-health in the GBD calculations.

i. *Gender gap in life expectancy*

In addition to the choice of "standard" against which losses are measured (see Section 3a), there is the issue of how to treat sex differences in longevity. In most societies, women live longer than men. In some countries, notably those of the former Soviet Union, life expectancy at birth is as much as 13 years greater for women than for men (World Bank 1998). Women's biological advantage is believed to account for part of this observed sex difference in life expectancy: rates of spontaneous abortion and stillbirth are higher for male foetuses in all societies, and excess male mortality persists during the first six months of life (WHO 1998a: 12). Reasons for this female advantage may include differences in chromosomal structure, possibly a slower maturing of boys' lungs due to the effects of testosterone (Waldron 1986), and also the biological protection against ischaemic heart disease afforded by endogenous estrogens (WHO 1998a: 12). That part of the difference in longevity which is attributable to biological differences is not (at least at present) amenable to intervention.

However, there is an important component to sex differentials in life expectancy that is socially determined, by factors heavily influenced by gender roles. In most countries, social factors reinforce the female biological advantage, with males experiencing greater exposure to risk factors such as smoking and occupational hazards; and higher levels of dangerous behaviours associated with "masculine" roles which tend to involve risk taking behaviour (WHO 1998a), a process which is itself highly gendered. In contrast, in some countries females (especially girls) are at a particular disadvantage in terms of allocations of food, health care and access to education (e.g. South Asia, China). The health costs of these gender-determined behaviours should be captured in any estimation of the burden of disease. This can be accomplished by using a gender gap in life expectancy that represents an estimate of the biological component only of the sex difference in longevity. In the construction of DALYs, a gender gap of 2.5 years is used, which is an estimate of the biological gap derived from observed differences in life expectancy among populations with relatively lower exposure to risk factors such as smoking and





occupational hazards (Murray 1994). The choice of gap has implications for the estimation of the disease burden of women relative to that of men. If the estimate of 2.5 years overestimates the real sex differential in life expectancy, the burden of disease of women will be underestimated relative to that of men. The reverse will arise if the true gap is less than 2.5 years (Anand and Hanson 1997).

## *ii. Valuation of non-fatal health states*

As described above, in calculating the burden of disease, DALYs assign a value of 1 to years lost to premature mortality (before age-weighting and discounting). For non-fatal health outcomes, time spent in that health state receives a "disability weight" ranging between 0 and 1, which is meant to reflect the loss of functioning associated with the disabling sequelae.

The approach to estimating disability weights taken in the GBD study was revised following the 1992 estimates (Murray 1996). Where previously groups of experts had assigned weights on the basis of descriptors of different levels of functional disability, the new protocol involved using the Person Trade Off (PTO) method<sup>9</sup> in a deliberative process. The protocol was designed to be used with health care providers, who were asked to evaluate "the average individual with the condition described taking into account the average social response or milieu" (Murray 1996: 38). The same group of experts (the great majority of whom were male) was also involved in assessing the distribution of possible outcomes for a given disease across the seven disability classes, so that an average disability weight, weighted by the distribution across the classes, could be calculated. A number of issues are raised by this process:

### *Whose values should be used?*

The GBD valuation procedures elicit disability weights from health professionals. Furthermore, most of these professionals were male. However, it is not at all clear that health professionals' assessments of disability weights are more valid than, for example, those of individuals who have experienced the health problem, or of their family members. Others have challenged the idea of using health professionals' assessments of disability weights. That different groups tend to assess the same health state in different ways is well-recognized (Nord 1992), with health professionals, patients, patients' families and the general public providing ratings which differ in systematic ways.

Sadana (1998) has studied differences between the GBD disability weights and weights she obtained from poor women in Cambodia using a visual analogue scale. Forty women aged 17-54 participated in the study, half of whom were sampled from households in Phnom Penh, and half selected from those seeking reproductive or psychiatric health services in Phnom Penh. Table 9 shows the disability weights for a range of health conditions from the GBD and Cambodia studies. Although strictly speaking, the weights are not directly comparable as they were elicited using different methods, a number



of interesting issues emerge. In 8 of the 12 health states which were common to both studies, women gave higher disability weights. In particular, those states that are associated with particular stigma and shame for women in Cambodia are associated with higher disability weights compared with the Geneva experts. These conditions include infertility and vitiligo. This finding is consistent across age groups, education levels, and the type of health problem that the individual was experiencing at the time of the interview. From these findings, Sadana concludes that it is essential to consider community/population values in resource allocation processes; that it is not surprising that different health state values arise in different contexts; and that improving the validity and reliability of values obtained in such exercises should not be pursued at the expense of suppressing conflict and different perspectives. Her work shows that reproductive illness is a revealing tracer for providing insight into how context influences the burden of illness and its valuation.

Table 9: Comparison of disability weights: Cambodia Reproductive Health Study vs. GBD

	Reproductive Health Study, Cambodia	GBD study, Geneva
HIV/AIDS	.936	
Active Psychosis	.909	.722
Maternal Death	.906	1 (all deaths)
Blindness	.818	.642
Quadriplegia	.800	.895
Dementia	.757	.762
Deafness	.696	.333
Infertility	.650	.191
Severe eclampsia	.647	
Below the knee amputation	.632	.281
Prolapse	.604	
Recto-vaginal fistula	.577	.373
Severe pain during sex	.567	
Vitiligo on face	.536	.020
Fetal death 7 months	.487	
Severe anaemia	.482	.111
Uni-polar depression	.451	.619
PID with symptoms	.437	
Abortion 3 months, hemorrhage/sepsis	.419	
Sad/chills/weak post-natal (local condition named toas)	.416	
No satisfactory contraception	.390	
Miscarriage 3 months	.344	
Unable to breastfeed	.284	
Moderate cramps/low back pain during period	.282	
Moderate dizziness	.187	
Bright skin/regular period & good family relations	.015	

Source: Sadana (1998)



*Is it appropriate to use the same weights for all countries?*

The different weightings that Cambodian women attach to different disease conditions raises the further issue of whether it is meaningful to use the same disability weights for all countries. The need to use a common weighting system derives from the desire to calculate the burden of disease at the global level, and to ensure that observed differences among regions arise from differences in disease prevalence, incidence, onset, etc., and not from differences in the valuation of disability states. However, if it can be demonstrated that different societies place very different weights on non-fatal health outcomes, this undermines the validity and meaning of such "global" measures. It suggests that such analyses may more appropriately be made at the regional, country, or sub-country level where there is sufficient agreement on the relative weights attached to different non-fatal health states.

*iii. Other values incorporated in the construction of DALYs*

Two additional values are incorporated in DALYs: discounting and age-weighting. Arguments against discounting of life-years are fully presented in Anand and Hanson (1997). One of the effects of discounting which should be of interest from a gender perspective is that discounting compresses the gender gap in life expectancy, because the additional years lived by women occur in the future, where they receive relatively less weight. This further reduces the estimated gap of the burden of disease of women relative to men.

Age-weighting assigns a different value to a year of life lost or lived with disability, depending on the age at which it is lived. The specific age weighting function that is used in DALYs attaches a greater value to a year of young or middle-aged life, compared with a year lived by young children or the elderly. Murray (1996) discusses in some detail the rationale for introducing age weights into DALYs. The main justification appears to be based on a notion of "welfare interdependence", which "clearly exists as some individuals play a critical role in providing for the well-being of others -- consider parents and their young children" (p. 59). The same age-weighting function is used for both men and women. However, it is not clear that the welfare transfers implied by the age weighting function are actually the same for men and women. In particular, young girls in many societies have extensive responsibilities for childcare and food preparation, and it is not clear that women's responsibilities for the welfare of others decline as they reach old age. The fact that these economic activities of young women are often not marketed reinforces the gender bias in the economic paradigm. This casts doubt on the validity of using the same age-weighting function for men and women. In general, the arguments in support of age-weighting are rather weak (see Anand and Hanson 1997 for a full discussion).



#### 4. PRIORITY SETTING AND COST-EFFECTIVENESS ANALYSIS

Most of the recent international health movements (Primary Health Care, Selective PHC, Child Survival and Development Revolution, Safe Motherhood, Better Health through Family Planning) have been aimed at reshaping health priorities (Murray 1990). Priority setting in the health sector using the principles of cost-effectiveness analysis is not new (Walsh and Warren 1979, the Ghana Health Assessment Team 1981, and Walsh 1988, all cited in Murray 1990). However, the analyses presented in the World Bank's Disease Priority Review (Jamison et al. 1993), and the 1993 World Development Report, have significantly raised the profile of these approaches. As a consequence the term "priority-setting" has become almost synonymous with the use of cost-effectiveness analysis to determine the allocation of health sector resources among interventions.

The principles of cost-effectiveness analysis as used together with GBD are straightforward. It is assumed that the overriding aim of health services is to minimize the aggregate burden of ill-health. Given a fixed health budget, this is accomplished by allocating resources to the interventions which provide the maximum health improvement per dollar. This requires a comparison of the costs of an intervention with its consequences in terms of reduction of disease burden (measured as the burden with and without intervention) to produce a "cost-effectiveness ratio". Interventions are then ranked by their cost-effectiveness ratio and resources allocated beginning with the "best buy", gradually moving down the list as the benefits of each intervention are exhausted. "League tables" of cost-effectiveness rankings appear in the 1993 World Development Report, were considered in the Oregon Medicaid reform proposals, and have been occasionally discussed in the context of UK Regional Health Authority health service purchasing (e.g. Allen, Lee and Lowson 1989).

Of course, this is only one possible use of cost-effectiveness analysis. CEA can also be used to evaluate the different alternatives for prevention/treatment of a particular illness at the individual or programme level (see, for example, the recent review of the cost-effectiveness of malaria prevention strategies by Goodman et al., in press).

##### a. General critique of cost-effectiveness approach

There are a number of general limitations of the cost-effectiveness framework. First, it only considers the health benefits of health sector interventions; similarly, it does not usually look at the health benefits of interventions outside the health sector. Thus, even with the narrowly-defined objective of burden minimization, the restricted perspective of cost-effectiveness analysis can lead to a sub-optimal resource allocation (Anand and Hanson 1997).



Secondly, the cost-effectiveness exercise is neutral to the distribution of benefits: preventing 10 years of burden for one person is equivalent to averting 1 year for each of 10 people; and a benefit to a rich person is identical to a benefit to a poor one. Minimizing the burden of ill-health is purely an efficiency criterion. While the introduction of "equity weights" has been proposed to accommodate such distributional issues (see for example, Kabeer 1994), this would require the incorporation of additional information about individuals, such as their income or poverty status. Such variables are strictly not part of the information that is collected as part of the GBD exercise, nor do they usually appear in epidemiological data sets.

#### b. Gender issues

In addition to these general limitations of priority setting using CEA, there are a range of gender issues which arise.

##### i. *Estimating the costs of treatment*

A relatively technical issue is the problem of valuation of the costs of health interventions. Women's time inputs into health interventions are frequently ignored (Leslie 1989); this may have the effect of orienting health services towards interventions which are particularly demanding in terms of women's time, without a full recognition of the costs incurred. At the same time, efforts to value such non-marketed inputs may be rendered more difficult to the extent that gendered processes keep women out of formal labour markets (Kabeer 1994).

##### ii. *Interdependent risks and multiple vulnerabilities*

A number of diseases are risk factors for other diseases. From the disease measurement point of view, this means that a simple calculation of mortality by immediate cause of death will not reflect a true picture of the ill-health due to a particular disease. The example given in Murray and Lopez is diabetes mellitus, which has its own sequelae, but which is also associated with increase risk of ischaemic heart disease and cerebrovascular disease (Murray and Lopez 1996). This interdependence is also important from an intervention point of view, in that the prevention of a primary case of diabetes will also prevent the other ill-health attributable to diabetes. Unless such interdependencies are taken into account, cost-effectiveness analysis will under-estimate the benefits from intervention. The GBD volumes treat a short number of risk factors in this way (TB, Hepatitis B and C, STDs, Chagas' disease, onchocerciasis, trachoma, diabetes mellitus, unipolar major depression, glaucoma and cataracts). However, there are a range of other such interactions, many of which are mediated by gender-related factors, that should be



taken into account in further work. Undernutrition has already been mentioned as a gender-related condition which increases the likelihood of contracting a range of infectious diseases. HIV infection and malaria is another area which requires further research.

*iii. Risk factors and the gendered processes that generate ill-health*

Reduction of disease burden can take the form of prevention and treatment of the disease itself, or prevention or reduction of exposures that may be the underlying cause of the disease or injury (Murray and Lopez 1996). Three types of risk factors are distinguished in the GBD study: "exposures" in the classical epidemiological sense; physiological states, such as hypertension or undernutrition; and social states such as poverty and inequality. The GBD study looks at the health consequences attributable to 10 different such risk factors, all of which fit into the first two categories. However, the data required for a gender analysis of such risk factors is not available, so that the epidemiological parameters being estimated (the "attributable burden") is likely to be underestimated. For example, in the absence of data on the relative risk of mortality from undernutrition of adults, only children aged 0-5 years have been included in the estimates of excess mortality and morbidity attributable to undernutrition (Murray and Lopez 1996: 303-305). Data on occupation-related injuries comes primarily from developed countries (exceptions are Mexico and, for some causes, China), where the gender patterns of work may differ substantially from those in developing countries. Finally, the focus of the disease burden attributable to air pollution is measures of total suspended particulates and sulphur dioxide. While indoor cooking will contribute to observed aggregate levels of these pollutants, there is no mechanism for recording womens' differential exposure, which arises from their gendered household roles.

Social states as risk factors are not examined.<sup>10</sup> One reason for excluding an analysis of social states as risk factors in the GBD work is that such an analysis would almost certainly require going beyond the narrow confines of the health sector and the interventions it can deliver alone. It would require what the Labour government in Britain calls "joined-up" thinking, involving policy initiatives which are multisectoral in their approach. At a very minimum, it would require a broader vision of health policy, rather than the current narrow focus on "health services".

Gender issues may also underpin a variety of these and other risk factors. There is a need to look at how gender roles contribute to the causes of ill-health among women (and men). To the extent that gender roles are important underlying risks, a focus on health interventions alone is unlikely to produce enduring improvements in health. For example, women may be differentially exposed to the risk of contracting a range of diseases by virtue of their domestic responsibilities (e.g. water collection activities and link with schistosomiasis; respiratory problems and indoor smoke from cooking). At the same time, certain gendered patterns of behaviour may also protect against infection (e.g. the requirement to dress in



certain ways may reduce the risk of mosquito bites). Women's work outside the house may also impose risks for ill-health. For example, nursing is a profession with a predominance of women. However, nurses have high rates of pre-term and low birthweight babies, and the factors contributing to these outcomes are well known: standing, lifting, moving heavy loads, the strains of night shifts (Oakley 1994). The point here is that with appropriately gender-disaggregated data, it should be possible to measure the health burdens arising from these roles; but that the focus on health interventions to minimize this burden will not resolve the fundamental causes of the differential exposure to such risks.

These arguments should not be limited to the health of women. The excess burden of male deaths due to accidents and injuries is also traced partly to gender roles. This is true for unintentional injuries such as occupational accidents, which reflect the historical role of men as economic supporters of households and their greater employment in more dangerous industries. Similarly, intentional injuries, which are more common among men, are closely connected to social constructions of what constitutes "masculine" behaviour (WHO 1998a). A focus on health interventions as a way to reduce the burden of these events surely takes us far away from its root causes.

Priority-setting approaches, with their biomedical/individualist foundations, cannot adequately address the gendered processes that generate ill-health. Even the narrowly defined goal of the priority-setting approach (i.e. minimize the burden of disease) cannot be achieved without taking account of gender-related factors. For example, it will not be enough to simply provide an essential package of cost-effective health services if women's access to health services is restricted. Priority-setting approaches need to broaden their perspective beyond what services to offer, to incorporate concerns about the gender-related factors that will influence their use. Women's access to health services may be limited by time constraints, issues of intra-household resource allocation and decision making, or legal and sociocultural constraints (Oxaal and Cook 1998). Even where women have physical access to health services, other cultural restrictions and constraints may make it difficult for them to access needed health services.

If the goal of health service planning is broadened to include equity considerations, the limitations of the narrow cost-effectiveness approach become even more pronounced. Improving health equity may require specific efforts to focus on measures which will achieve health gains for disadvantaged groups: a simple efficiency criterion will not suffice. This raises two different sorts of issues. First, there are additional information needs -- who are those who are relatively disadvantaged, and not just in health terms. And second, more focus is needed on the processes which underlie poor health: this will almost certainly require reaching beyond the limits of biomedical individualism (Fee and Krieger 1993) looking at the social and historical forces generating disadvantage, and looking beyond the individual to the level of groups.



## CONCLUSIONS

Burden of disease measurement and priority setting are powerful tools for supporting decision making in the health sector. They make explicit a number of value choices which were often obscured in previous attempts to shift health sector priorities. However, there are a number of areas in which they continue to be opaque, and create room for gender bias.

I have discussed three broad areas where gender bias may arise. The first concerns issues relating to the availability of data, in particular accurate measures of disease incidence or prevalence, for men and women. These are problems which could, in practice, be resolved with adequate sensitivity to the potential for gender bias and sufficient resources devoted to collection of data.

The second set of problems relates to issues which are subject to continued debate and which cannot be “fixed” through technical solutions. These include what the appropriate concept of burden is (e.g. whether it should be limited to disability, or broadened to handicap, which would take into account the social setting in which ill-health occurs, or an even broader measure of burden which looks beyond the individual to the burden of carers); or whose values should be used to assign “burden” weights for non-fatal illness.

Finally, there are some fundamental problems with the use of cost-effectiveness analysis as a tool for priority setting in the health sector. First, though analytically convenient, it is not clear that the same indicator (DALYs) should be used for both measurement of disease burden and resource allocation so as to minimize that burden, as such an approach ignores important vertical equity concerns in health sector resource allocation. For example, in measuring the aggregate burden of disease it may be desirable to use the minimal information set of DALYs (age, sex, disability status and time period). However, if an objective of resource allocation is to improve health equity we need to know about other characteristics of individuals who are ill, including their disadvantage in other spaces, such as income or broader measures of socioeconomic status, and their access to health and other public services.

A second problem with the GBD-priority setting approach is its focus on individual outcomes and health interventions. If the allocation of resources is to improve health and health equity, it needs to address the processes that generate ill-health and which influence access to health care resources. Some of these are gendered processes, while others relate to broader structures of inequality and disadvantage.

These concerns about burden of disease measurement and priority-setting point to two areas of action for those concerned with gender and gender equity. First, within the broad GBD approach, there is a need to collect better data about women’s (and men’s) health. This means that more effort is needed to investigate disease prevalence and incidence; to support research which examines the consequences of ill-health for women and to identify where these are different from the consequences for men; to identify and



explore interactions among different diseases; and to ensure that the range of stakeholders involved in valuing non-fatal health outcomes is as broad as possible. At the same time, more research is needed into the ways that valuations of health states differ in different parts of the world. Given that the next round of GBD estimates is scheduled to start in 2000, these efforts are needed now, so that the results can be taken into account in the next version of the GBD.

Secondly, a broader effort is needed to improve the measurement of women's *health* (rather than disease). There needs to be a closer dialogue between experts in women's health, and experts in disease measurement and health economics, in order to better integrate ideas and concepts relating to health measurement that have been developed in parallel. Such an effort should be sensitive to the uses that will be made of such data, particularly its use in planning health services. This might imply disentangling the issues of activities that promote health vs. those that treat disease. It also needs to be sensitive to differences in health consequences and burdens across settings, and to grapple with some of the thornier issues of what burden to measure and how it should be valued. For instance, more attention could be paid to the particular burdens of women as caretakers of people who are ill.

The Global Burden of Disease study provides a rich source of information on mortality and morbidity in both developed and developing regions of the world. It is a potentially powerful tool for women's health advocates to use in mobilizing for reallocation of health resources. However, effort is needed to strengthen its conceptual and technical basis in order to make it more sensitive to issues of gender and health, so that its value as a tool for health sector analysis can be increased.

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## ENDNOTES

1. Throughout this paper I try to maintain a clear distinction between sex and gender. Sex is related primarily to biological and physiological factors, while gender refers to the range of socio-cultural norms which determine expectations, behaviours and roles, as well as structural inequalities in access to resources. Sex and gender often interact, so that they are not always clearly distinguishable.
2. This desire to aggregate across different health states may be misguided: death and disability may simply be incommensurable, and not be put on the same scale at all (Anand and Hanson 1997).
3. I am grateful to Patrick Vaughan for discussions on this issue.
4. The advantage of using a life-table approach which incorporates an expectation of life at each age (rather than, for example, Potential Years of Life Lost which fixes the maximum at an arbitrary limit) is that in populations where life expectancy at birth exceeds this standard, life expectancy at any age (particularly ages over 80 for men and 82.5 for women) will still be positive, allowing some shortfall from perfect health to be captured.
5. The ICIDH classification scheme defines impairment at the level of the organ system, disability as the impact on the individual's performance, and handicap as the overall consequences of the disease, which depends on the social environment. The example given in Murray (1994) is helpful in clarifying the distinctions between the three: "...the loss of a finger or an eye is an impairment. The consequent disability may be the loss of fine motor function or sight... the loss of fine motor function may be a greater handicap, in this terminology, for a concert violinist than for a bank-teller" (Murray 1994: 11).
6. Though, Murray (1996) notes that the method for eliciting disability weights probably results in ratings which correspond to the average level of handicap.
7. In the GBD, infertility is included as a sequela of chlamydia, gonorrhoea, maternal sepsis and abortion. It receives a disability weight of 0.180.
8. I am grateful to Patrick Vaughan for pointing out this gender difference.
9. One form of PTO asks participants to trade-off life extension of healthy individuals and life extension of individuals in a given health state (for example, taking the perspective of a decision maker, would you prefer to purchase interventions that will provide one year of life for 1000 perfectly healthy individuals or 2000 blind individuals?). The second form asks participants to trade-off between raising the quality of life of those in a given health state (state *i*) to perfect health for one year and extending life for healthy individuals for one year. Both forms of the PTO process arrive at preference weights for the health state being considered (Murray 1996).
10. The risk factors which are studied are: malnutrition, poor water supply, sanitation and personal and domestic hygiene practices, unsafe sex, tobacco, alcohol, occupation, hypertension, physical inactivity, illicit drugs, and air pollution.



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